What is claimed is:

1. A process for producing a composite-material semi-finished product configured to be foamed when heated for the fabrication of components having solid metallic cover layers and a closed porous metallic foam core arranged between the metallic cover layers, the process comprising:

removing under vacuum pressure, at least one gas and moisture from a powder mixture made of at least one metallic powder and at least one expanding agent powder;

compacting the powder mixture to a core layer; and

metallically joining the core layer to the composite-material semi-finished product via at least one oxide-free cover layer under a pressure and at a temperature below an outgas temperature of the expanding agent powder, wherein the at least one oxide-free cover layer is under vacuum pressure.

2. A process as defined in claim 1, further comprising:

substantially filling a container having first and second opposing covers with the powder mixture;

vacuum sealing the container;

substantially evacuating the container; and

compacting the container to simultaneously compact the powder mixture and metallically join the powder mixture to the first and second opposing covers.

3. A process as defined in claim 2, wherein substantially filling the container comprises disposing a pre-compacted body made of the powder mixture, wherein the

pre-compacted body is made using one of a cold isostatic pressing process and a hot isostatic pressing process.

4. A process as defined in claim 2, wherein compacting the container comprises using one of a high-speed forging process, an explosion forging process, an axial pressing process, a cold isostatic pressing process and a hot isostatic pressing process.

5. A process as defined in claim 1, wherein removing the at least one gas and moisture from the powder mixture comprises heating the powder mixture to a temperature below the outgas temperature of the expanding agent powder during the removal process.

6. A process as defined in claim 1, further comprising:

shaping the composite-material semi-finished product into a semi-finished product generally corresponding to a component; and

foaming the semi-finished product at a temperature above the outgas temperature of the expanding agent powder, within the solid/liquid range of the metallic powder, and below a melting temperature of the cover layer material to form the component.

7. A process as defined in claim 6, wherein the component is configured for use in at least one of an automotive application, a ship building application, an aerospace application, a mechanical energy absorption application, a shipping container application, a thermal insulation application and an acoustical insulation application.

8. A process as defined in claim 1, wherein removing the at least one gas and moisture comprising removing substantially all foreign gas inclusions and moisture from the powder mixture.

9. A process as defined in claim 1, wherein the core layer and the at least one oxide-free cover layer are made of aluminum, and wherein the expanding agent powder is between about 0.3 and 1.9 percent by weight of the powder mixture.

10. A method for fabricating a composite material, comprising:

forming a core layer between opposing outer layers, wherein the core layer includes a mixture of at least one metallic powder and at least one expanding agent;

removing moisture and gasses from the core layer by applying a first vacuum pressure to at least the core layer; and

compacting the core layer and the outer layers to bond the core layer to the outer layers while a second vacuum pressure is applied to at least one of the outer layers.

11. A method as defined in claim 10, wherein the first and second vacuum pressures are substantially equal.

12. A method as defined in claim 11, wherein compaction of the core layer is initiated without interrupting application of the first and second vacuum pressures.

13. A method as defined in claim 10, wherein the moisture and the gasses are removed from the core layer prior to compaction of the core layer.

14. A method as defined in claim 10, wherein compaction of the core layer is performed at a temperature below an outgas temperature of the expanding agent.

15. A method as defined in claim 10, wherein at least one of the outer layers is substantially free of an oxide.

16. A method as defined in claim 10, further comprising heating the core layer to a temperature greater than or equal to a melting temperature of the at least one metallic powder and an outgassing temperature of the at least one expanding agent to cause the core layer to form a closed-pore metallic foam.

17. A method as defined in claim 10, wherein the outer layers are made of a solid metallic material.

18. A method as defined in claim 10, wherein the composite material forms a semi-finished product and further comprising heating the semi-finished product to foam the core layer to form a finished product.

19. A method as defined in claim 10, wherein forming the core layer between the opposing outer layers comprises substantially filling a container having a bottom surface and a cover with the powder mixture.

20. A method as defined in claim 19, wherein removing the moisture and the gasses from the core material comprises vacuum sealing the container by welding the cover and evacuating the container with the first vacuum pressure.

21. A method as defined in claim 10, wherein the powder mixture is compacted using at least one of a cold isostatic pressing operation and a hot isostatic pressing operation prior to being disposed between the outer layers.

22. A method as defined in claim 10, wherein compacting the core layer comprises performing at least one of a high-speed forging operation, an explosion forging operation, an axial pressing operation, a cold isostatic pressing operation and a hot isostatic pressing operation.

23. A composite material, comprising:

a core layer including a mixture of at least one metallic powder and at least one expanding agent powder, wherein the core layer is compacted and substantially free from moisture and imbedded gasses and wherein the expanding agent powder is configured to outgas at a temperature near to a melting temperature of the metallic powder; and

outer layers bonded to the core layer, wherein the outer layers have a melting temperature exceeding the melting temperature of the metallic powder and are substantially free from perforations enabling the escape of gas and moisture during foaming of the core layer.

24. A composite material as defined in claim 23, wherein the outer layers are made of aluminum.

25. A composite material as defined in claim 23, wherein the expanding agent powder comprises titanium hydride powder.

26. A composite material as defined in claim 25, wherein the titanium hydride powder comprises 0.3% to 1.9% of the core layer by weight.